

Original Communication

Coronal displacement of cementum in impacted teeth: As age marker

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Abstract

Dental cementum is a vital tissue that demonstrates continuous apposition throughout the life of a tooth. This study was conducted on 130 impacted mandibular third molars extracted from healthy patients, aged between 18 and 38 years. The buccolingual ground sections were prepared and the distance between the edges of enamel and cementum were measured with micrometer attached to a light microscope. A significant correlation ($r = 0.56$) between age and coronal displacement of cementum in impacted teeth was calculated and a regression equation was derived for age determination.

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Keywords: Cementum; Enamel; Cemento–enamel junction; Fully impacted teeth; Mandibular third molar; Age estimation

Introduction

Cementum is the calcified tissue that surrounds the dentine and forms the attachment site for the periodontal fibers that link the tooth to alveolar bone. In cementum formation, hypermineralized layer of extracellular matrix alternate with less mineralized layers. The first layer of acellular cementum is produced before the tooth erupts and further layers are added during and after eruption. Cementum layer consist primarily of uncalcified dense bundles of collagen fibrils. These bundles later become mineralized by hydroxyapatite crystals, the changing orientations of which may be responsible for the optical effect of alternating dark and translucent layers. The first use of cementum in human age estimation began with measurements of width of the total cementum layer rather than with counts of incremental lines.¹ Many questions remain unanswered regarding the mechanisms of tooth cementum annulations and its influencing factors, particularly concerning the interpretation of seasonal increments.^{2,3} Two major factors are found to be responsible for

these changes, which are environmental effects and aging.⁴ Previous studies have reported significant positive correlation between age and coronal displacement of cementum in impacted teeth.^{5,6} Hence the study was planned to derive a regression equation from coronal displacement of cementum in impacted teeth and chronological age for age estimation.

Methods and materials

Our sample consists of 130 freshly extracted fully impacted permanent teeth third mandibular molar (67M and 63F, aged between 18 and 38) collected from Government Dental College, (Rohtak), Bhagwan Dental Clinic (Jind) and Jain Dental Clinic (New Delhi). In addition to the extraction date of the tooth and reason for extraction, the records contain the patient's date of birth and ethnicity. In all cases, tooth extractions were performed as part of essential dental care. Additional care was taken during the extraction procedure to minimize damage to teeth. Teeth which were broken during extraction were excluded from the study.

The teeth were rinsed in running water and were placed in formalin solution for 17 days. The

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Table 1
The results of cementum enamel distance (μm) measurements in impacted teeth in different age groups (years)

Age groups	Cementum and enamel distance (μm) (mean + SD) Impacted teeth
18–23	42.34 ± 0.21
23.1–28	89.42 ± 0.34
28.1–33	167.25 ± 0.23
33.1–38	398.53 ± 0.24

$p < 0.01$.

buccolingual ground sections were prepared from each specimen. The distance between the enamel and cementum, or the amount of cementum overlapping the cervical region of the ground sections of teeth, were measured by means of a micrometer attached to a light microscope. The measurements were (x) when there was a distance between cementum and enamel, (y) was assigned when there was an edge to edge relationship and (z) in case of cementum overlap. The data were entered into a computer using FOXPRO software and a data file was generated. The data was then analyzed utilizing statistical package of social sciences (version 11.0). The one way analysis of variance and student t -test were used to test the difference between means.

Results

The measurement distance (μm) between the edges of enamel and cementum in the impacted teeth and the age of patients in years has been shown in Table 1.

A significant correlation between the age of the patient and cementum overlap ($p < 0.01$, $r = 0.56$) on impacted teeth were observed and following BR regression equation has been proposed by me

$$\text{Age} = \frac{(\text{Cementum} - \text{enamel distance}) + 439}{22.4}$$

Discussion and conclusion

The study has shown that there is a highly significant correlation between age and coronal displacement of cementum in impacted teeth as in previous study.^{5,6} It has been observed that continuous displacement of cementum occurs with aging. The previous studies observed that there was no correlation between age and coronal displacement in cementum in erupted teeth because of direct contact with external environment.^{5,6} To my knowledge no formula or equation regarding age determination from coronal displacement of cementum in impacted teeth is available at the previous studies. Thus BR regression equation could be of significance in age determination from impacted teeth from medico legal purpose.

Conflict of interest

None declared.

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